## **Claims**

- 1. An isolated cell that recombinantly expresses an N-type calcium channel comprising a Ca<sub>V</sub>2.2 subunit that comprises exon e37a (Ca<sub>V</sub>2.2e[37a]).
- 2. The isolated cell of claim 1, wherein the Ca<sub>V</sub>2.2e[37a] subunit has a human sequence.
- 3. The isolated cell of claim 1, wherein the  $Ca_V 2.2e[37a]$  subunit has a mouse sequence.
- 10 4. The isolated cell of claim 1, wherein the Ca<sub>V</sub>2.2e[37a] subunit has a rat sequence.
  - 5. The isolated cell of any of claims 1-4, wherein the cell is a neuron.

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- 6. The isolated cell of any of claims 1-4, wherein the cell is an oocyte.
- 7. An isolated neuron that expresses an N-type calcium channel comprising a  $Ca_V 2.2$  subunit that comprises exon e37a ( $Ca_V 2.2e[37a]$ ).
- 8. The isolated neuron of claim 7, wherein the neuron further expresses a marker of nociceptive neurons.
  - 9. The isolated neuron of claim 8, wherein the marker of nociceptive neurons is Na<sub>V</sub>1.8.
- 10. The isolated neuron of claim 8, wherein the marker of nociceptive neurons is vanilloid receptor VR1.
  - 11. The isolated neuron of claim 8, wherein the neuron expresses both  $Na_V 1.8$  and vanilloid receptor VR1.
- 12. A method for identifying lead compounds for a pharmacological agent useful in the treatment of disease associated with increased or decreased voltage regulated calcium influx mediated by a N-type calcium channel containing a Ca<sub>V</sub>2.2e[37a] subunit comprising

providing a cell or other membrane-encapsulated space comprising a  $Ca_V 2.2e[37a]$  polypeptide;

contacting the cell or other membrane-encapsulated space with a candidate pharmacological agent under conditions which, in the absence of the candidate pharmacological agent, cause a first amount of voltage regulated calcium influx into the cell or other membrane-encapsulated space; and

determining a test amount of voltage regulated calcium influx as a measure of the effect of the lead compounds for a pharmacological agent on the voltage regulated calcium influx mediated by a N-type calcium channel containing a Ca<sub>V</sub>2.2e[37a] subunit,

wherein a test amount of voltage regulated calcium influx which is less than the first amount indicates that the candidate pharmacological agent is a lead compound for a pharmacological agent which reduces voltage regulated calcium influx and wherein a test amount of voltage regulated calcium influx which is greater than the first amount indicates that the candidate pharmacological agent is a lead compound for a pharmacological agent which increases voltage regulated calcium influx.

- 13. The method of claim 12, further comprising the step of loading the cell or other membrane-encapsulated space with a calcium-sensitive compound which is detectable in the presence of calcium, wherein the calcium-sensitive compound is detected as a measure of the voltage regulated calcium influx.
- 14. The method of claim 12, wherein the pharmacological agent that specifically reduces voltage regulated calcium influx mediated by a N-type calcium channel containing a  $Ca_V 2.2e[37a]$  subunit is an agent that reduces N-type calcium channel current densities in nociceptive neurons.
- 15. The method of claim 14, wherein the pharmacological agent that specifically reduces voltage regulated calcium influx mediated by a N-type calcium channel containing a Ca<sub>V</sub>2.2e[37a] subunit is useful as an analgesic agent.
- 16. A method for identifying compounds which selectively or preferentially bind a N-type calcium channel containing a Ca<sub>v</sub>2.2e[37a] subunit comprising,

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providing a first cell or membrane encapsulated space which expresses a N-type calcium channel that contains a  $Ca_V 2.2e[37a]$  subunit,

providing a second cell or membrane encapsulated space which expresses a N-type calcium channel that does not contain a Ca<sub>V</sub>2.2e[37a] subunit, wherein the second cell or membrane encapsulated space is identical to the first cell except for the N-type calcium channel expressed,

contacting the first cell or membrane encapsulated space and the second cell or membrane encapsulated space with a compound, and

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determining the binding of the compound to the first cell or membrane encapsulated space and the second cell or membrane encapsulated space,

wherein a compound which binds the first cell or membrane encapsulated space but does not bind the second cell or membrane encapsulated space is a compound which selectively binds the N-type calcium channel that contains a  $Ca_V 2.2e[37a]$  subunit, and wherein a compound which binds the first cell or membrane encapsulated space in an amount greater than the compound binds the second cell or membrane encapsulated space is a compound which preferentially binds the N-type calcium channel that contains a  $Ca_V 2.2e[37a]$  subunit.

- 17. The method of claim 16, wherein the N-type calcium channel that does not contain a Ca<sub>v</sub>2.2e[37a] subunit is a N-type calcium channel that contains a Ca<sub>v</sub>2.2e[37b] subunit.
  - 18. A method for identifying compounds which selectively or preferentially bind to a Ca<sub>V</sub>2.2e[37a] isoform comprising,

providing a Ca<sub>V</sub>2.2e[37a] isoform polypeptide or nucleic acid, providing a Ca<sub>V</sub>2.2e[37b] isoform polypeptide or nucleic acid,

contacting the  $Ca_V 2.2e[37a]$  isoform polypeptide or nucleic acid and the  $Ca_V 2.2e[37b]$  subunit isoform polypeptide or nucleic acid with a compound, and

determining the binding of the compound to the  $Ca_V 2.2e[37a]$  isoform polypeptide or nucleic acid and the  $Ca_V 2.2e[37b]$  isoform polypeptide or nucleic acid,

wherein a compound which binds the  $Ca_V 2.2e[37a]$  isoform polypeptide or nucleic acid but does not bind the human N-type calcium channel  $Ca_V 2.2e[37b]$  isoform polypeptide or nucleic acid is a compound which selectively binds the  $Ca_V 2.2e[37a]$  isoform, and wherein

a compound which binds the  $Ca_V2.2e[37a]$  isoform polypeptide or nucleic acid in an amount greater than the compound binds the  $Ca_V2.2e[37b]$  isoform polypeptide or nucleic acid is a compound which preferentially binds the  $Ca_V2.2e[37a]$  isoform.

- 5 19. The method of any of claims 16-18, wherein the compound is an antibody or a antigen-binding fragment thereof.
  - 20. The method of any of claims 16-18, wherein the compound is a nucleic acid molecule.
- 10 21. The method of any of claims 16-18, wherein the compound is a compound is a library of molecules.
  - 22. The method of claim 21, wherein the library is a natural product library.
- 15 23. The method of claim 21, wherein the library is a library generated by combinatorial chemistry.
- A method for preparing an analgesic agent, comprising
   identifying an agent that selectively or preferentially reduces calcium channel current
  densities in nociceptive neurons mediated by N-type calcium channels containing a
  Ca<sub>V</sub>2.2e[37a] subunit, and

formulating the agent for administration to a subject in need of such treatment.

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- A method for preparing an analgesic agent, comprising
  identifying a compound according to the method of any of claims 12-23, and
  formulating the compound for administration to a subject in need of such treatment.
  - 26. A double stranded RNA molecule specific for Ca<sub>V</sub>2.2e[37a] RNA.
- The double stranded RNA molecule of claim 26, wherein the molecule is 21-23 nucleotides in length.

- 28. The double stranded RNA molecule of claim 26, wherein the molecule has a 3' overhang.
- 29. The double stranded RNA molecule of claim 28, wherein the 3' overhang is 2 nucleotides in length.
  - 30. The double stranded RNA molecule of claim 26, wherein the molecule is a single molecule that comprises a hairpin structure.
- 10 31. A method for inhibiting calcium influx in a neuronal cell mediated by a N-type calcium channel containing a Ca<sub>V</sub>2.2e[37a] subunit comprising

contacting the neuronal cell with an amount of a  $Ca_V 2.2e[37a]$  inhibitor effective to inhibit calcium influx in the mammalian cell.

- The method of claim 31, wherein the inhibitor is selected from the group consisting of an antibody which selectively binds the Ca<sub>V</sub>2.2e[37a] polypeptide, an antisense nucleic acid that reduces expression of a Ca<sub>V</sub>2.2e[37a] polypeptide, a siRNA that reduces expression of a Ca<sub>V</sub>2.2e[37a] polypeptide.
- 20 33. A method for treating a subject afflicted by pain mediated by a N-type calcium channel containing a Ca<sub>V</sub>2.2e[37a] subunit comprising

administering to a subject in need of such treatment an inhibitor of the  $Ca_V 2.2e[37a]$  polypeptide in an amount effective to inhibit voltage regulated calcium influx and thereby to reduce the pain.

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34. The method of claim 33, wherein the inhibitor is selected from the group consisting of an antibody which selectively binds the  $Ca_V 2.2e[37a]$  polypeptide, an antisense nucleic acid that reduces expression of a  $Ca_V 2.2e[37a]$  polypeptide, a siRNA that reduces expression of a  $Ca_V 2.2e[37a]$  polypeptide.

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35. The method of claim 33, wherein the inhibitor is administered prophylactically to a subject at risk of being afflicted with pain.

36. The method of claim 33, wherein the pain is neuropathic pain.